A.D. 1859, *5th MARCH.* N° 588.

SPECIFICATION

OF

RICHARD LEAKE AND MATTHEW SYKES.

FURNACES.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY:
PUBLISHED AT THE GREAT SEAL PATENT OFFICE,
25, SOUTHAMPTON BUILDINGS, HOLBORN.
1859.

A.D. 1859, 5th *March*. N° 588.

Furnaces.

LETTERS PATENT to Richard Leake and Matthew Sykes, both of Barnsley, in the County of York, for the Invention of "IMPROVEMENTS IN FURNACES FOR CONSUMING SMOKE AND GENERATING HEAT, PARTS OF WHICH IMPROVEMENTS ARE APPLICABLE TO FURNACES GENERALLY."

Sealed the 31st August 1859, and dated the 5th March 1859.

PROVISIONAL SPECIFICATION left by the said Richard Leake and Matthew Sykes at the Office of the Commissioners of Patents, with their Petition, on the 5th March 1859.

We, RICHARD LEAKE and MATTHEW SYKES, both of Barnsley, in the County of York, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN FURNACES FOR CONSUMING SMOKE AND GENERATING HEAT, PARTS OF WHICH IMPROVEMENTS ARE APPLICABLE TO FURNACES GENERALLY," to be as follows:—

This Invention has for its objects the prevention of smoke and generating heat in the furnaces of steam engine boilers, boiling pans, or other kinds of furnaces, and is an improvement upon our former Invention (for which Letters Patent were granted to us on the 1st day of May 1857, and numbered 1233), being based on the fact that $\frac{4}{5}$ (by weight, of water is oxygen, and bulk for bulk, water is 825 times heavier than common air, so that when $\frac{4}{5}$ is taken from the gross weight of water it gives 660 times more oxygen in one inch of water than is contained in atmospheric air of the same bulk; and when water (in proper quantity) is introduced to the fires in furnaces of steam boilers through the spaces between the fire bars, instead of having a cooling effect it will give off a large quantity of gases, and produce a more intense heat than

can be produced in any other way, except where means similar to those employed in blast furnaces are adopted.

To attain the objects before mentioned, we place perforated water pipes either lengthways or crossways to the grate bars (either solid or hollow bars) immediately beneath them; these pipes may be made the whole width of the ash-pit, or divided into two halves, in which case whichever side of the fire the stoker wishes to clean can be done by applying the water to that side only; the side watered is thus cooled, the stoking room kept free from dust, and the comfort of the stoker greatly promoted. To use this plan effectually a moderately clean fire should be kept, from 4 to 7 inches thick, equally spread on the grate, and as soon as the fire doors are shut, either after firing or poking, the water should be administered instantaneously. The effect of this will be a very powerful draft through the fire, and consequently a great rush of cold air into the ash-pit; this will raise the clinkers on the fire bars and keep them loose, thereby obviating the necessity of using reciprocating bars. We propose to use either one or two doors and door frames at which to throw the fuel in, and one on each side to enable the stoker the more effectually to clean his fire, also to stir the fire through the same doors without opening the middle doors; behind these side doors are two perforated doors hung on pivots; these (when the poker is thrust against the bottom edge) open no farther than the thickness of the poker; thus so large a quantity of cold air is not admitted as would be the case if the middle doors were opened. When the stoker wishes to clean the grate he turns one half of the fire over the other half, he then admits the water and slacks the clinkers until cold. Fire brick tubes or quarries are placed in such a manner that when the fire doors are opened, the cold air then admitted is caused to impinge upon the surface of the fire instead of being directed to the bottom of the boiler. A combustion chamber is also formed, which presents a non-conducting medium between that part of the boiler which is over the fire and the clear fire on the grate, thereby preventing the boiler plates cracking or being drawn down as they often are in that part of the boiler.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said Richard Leake and Matthew Sykes in the Great Seal Patent Office on the 5th September 1859.

TO ALL TO WHOM THESE PRESENTS SHALL COME, we, Richard Leake and Matthew Sykes, both of Barnsley, in the County of York, send greeting.

Leake & Sykes' Improvements in Furnaces for Consuming Smoke, &c.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Fifth day of March, in the year of our Lord One thousand eight hundred and fifty-nine, in the twenty-second year of Her reign, did, for Herself, Her heirs and successors, give and grant unto us, the said Richard Leake and Matthew Sykes, Her special licence that we, the said Richard Leake and Matthew Sykes, our executors, administrators, and assigns, or such others as we, the said Richard Leake and Matthew Sykes, our executors, administrators, and assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "IMPROVEMENTS IN FURNACES FOR CONSUMING SMOKE AND GENERATING HEAT, PARTS OF WHICH IMPROVEMENTS ARE APPLICABLE TO FURNACES GENERALLY," upon the condition (amongst others) that we, the said Richard Leake and Matthew Sykes, our executors or administrators, by an instrument in writing under our or their hands and seals, or under the hand and seal of one of us or them, should particularly describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that we, the said Richard Leake and Matthew Sykes, do hereby declare the nature of the said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement thereof, that is to say :—

This Invention has for its objects the prevention of smoke and generating heat in the furnaces of steam engine boilers, boiling pans, or other kinds of furnaces, and is an improvement upon our former Invention (for which Letters Patent were granted to us on the 1st day of May 1857, No. 1233), being based on the fact that $\frac{4}{5}$ (by weight) of water is oxygen, and bulk for bulk, water is 825 times heavier than common air, so that when $\frac{4}{5}$ is taken from the gross weight of water it gives 660 times more oxygen in one inch of water than is contained in atmospheric air of the same bulk. And when water (in proper quantity) is introduced to the fires in furnaces of steam boilers through the spaces between the fire bars, instead of having a cooling effect it will give off a large quantity of gases, and produce a more intense heat than can be produced in any other way, except where means similar to those employed in blast furnaces are adopted.

In order to explain our said Invention as completely as possible, we now

proceed to describe the best means we are acquainted with for carrying the same into practical effect, reference being had to the illustrative Sheets of Drawings hereunto annexed, and to the numeral figures and letters of reference marked thereon respectively as follows:—

Description of the Drawings.

At Sheet 1, Figure 1 is a longitudinal and vertical section of our improved furnace; at Sheet 2, Figure 2 is a horizontal section, with one end of boiler broken off to shew the water pipes; and at Sheet 3, Figure 3 is a front end elevation of furnace and boiler; Figure 4, cross section through the line A, B, Figure 1 (Sheet 1); Figure 5, front elevation of doors and door frame, herein-after described; and Figure 6, plan view of Figure 5. Similar letters of reference denote corresponding parts where such parts appear or can be seen at each of the Figures respectively.

To attain the objects before mentioned, we place perforated water pipes *a*, *a*, Sheets 1, 2, 3, Figures 1, 2, 4), either lengthways or crossways to the grate bars *b*, *b*, (either solid or hollow bars), immediately beneath them; these pipes may be made the whole width of the ash-pit, or divided into two halves, as at Sheet 2, Figure 2, and Sheet 3, Figure 4, in which case whichever side of the fire the stoker wishes to clean can be done by applying the water to that side only; the side watered is thus cooled, the stoking room kept free from dust, and the comfort of the stoker greatly promoted. To use this plan effectually a moderately clean fire should be kept, from 4 to 7 inches thick, equally spread on the grate, and as soon as the fire doors are shut, either after firing or poking, the water should be administered instantaneously. The effect of this will be a very powerful draft through the fire, and consequently a great rush of cold air into the ash-pit; this will raise the clinkers on the fire bars, and keep them loose, thereby obviating the necessity of using reciprocating bars. We propose to use either one or two doors *c*, *c*, Sheet 3, Figure 5, and door frames, at which to throw the fuel in, and one on each side, *d*, *d*, to enable the stoker the more effectually to clean his fire, also to stir the fire through the same doors without opening the middle doors; behind these side doors *d*, *d*, are two perforated doors *e*, *e*, hung on pivots *f*, *f*, (Sheet 3, Figure 6); these (when the poker is thrust against the bottom edge) open no farther than the thickness of the poker, thus so large a quantity of cold air is not admitted as would be the case if the middle doors *c*, *c*, were opened. When the stoker wishes to clean the grate he turns one half of the fire over the other half, he then admits the water and slacks the clinkers until cold. Fire brick tubes or quarries *g* are placed in such a manner that when the fire doors are opened the cold air then

admitted is caused to impinge upon the surface of the fire instead of being directed to the bottom of the boiler. A combustion chamber *h* is also formed, which presents a non-conducting medium between that part of the boiler which is over the fire, and the clear fire on the grate, thereby preventing the boiler plates cracking or being drawn down as they often are in that part of the boiler.

Having now fully described the nature and object of our said Invention of "Improvements in Furnaces for Consuming Smoke and Generating Heat, Parts of which Improvements are applicable to Furnaces generally," together with the best means we are acquainted with for carrying the same into practical effect, we would remark in conclusion that we do not confine or restrict ourselves to the precise details herein described and shown in the accompanying Sheets of Drawings, as certain modifications may be made therein without in any way departing from the principle of our Invention; but what we claim as our Invention intended to be secured to us by the herein in part recited Letters Patent is,—

Firstly, the use of water pipes or tubes beneath the fire bars, or any other arrangement by which the same purpose may be effected.

Secondly, the use of the centre and side doors, as shown at Figures 5 and 6 of Sheet 3.

And lastly, the combination and use of all the parts, either separately or in combination with our former Patent, herein-before mentioned and herein fully described and exhibited in the accompanying illustrative Sheets of Drawings, for the purposes herein set forth.

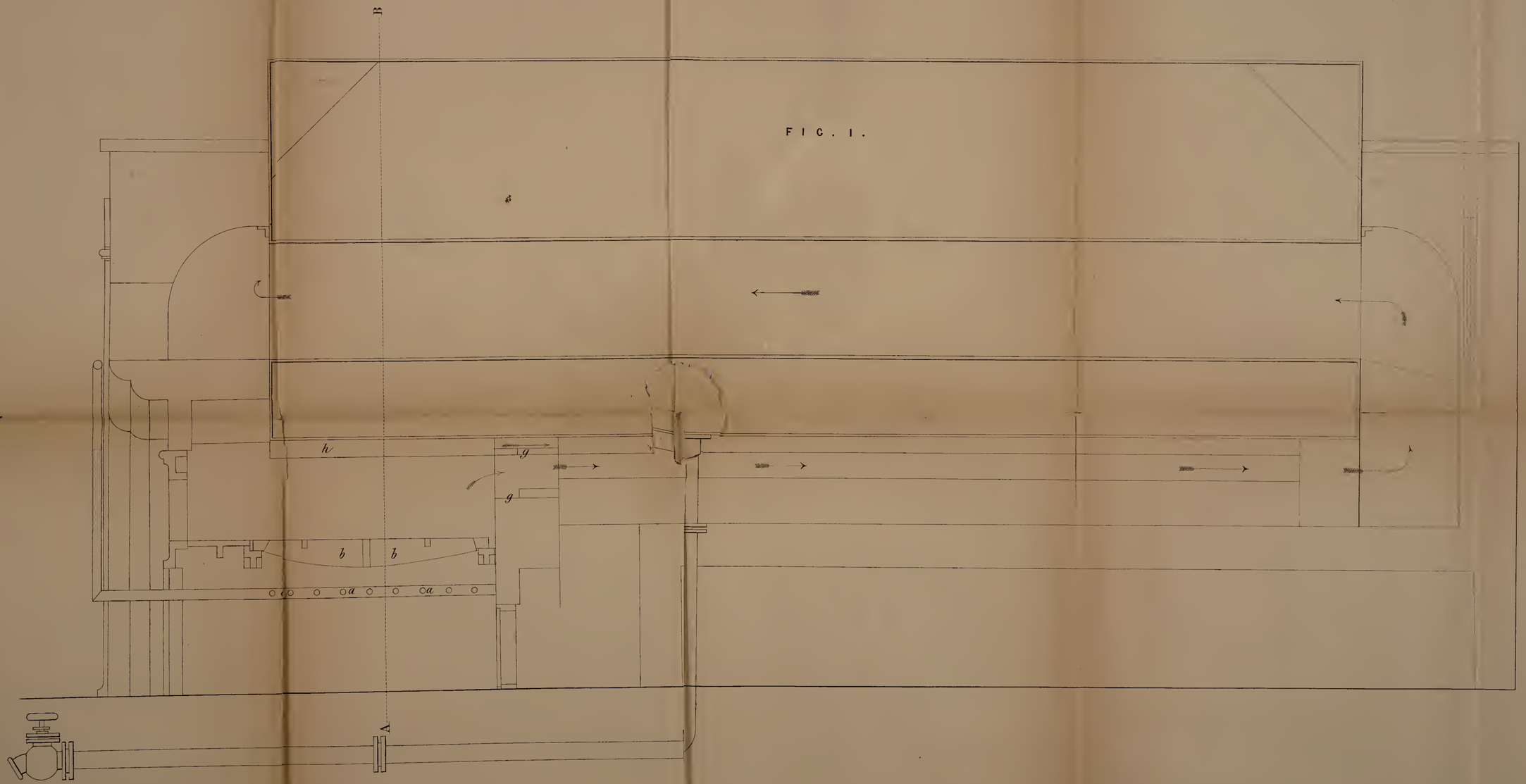
In witness whereof, we, the said Richard Leake & Matthew Sykes, have hereunto set our hands and seals, this 1st day of September, in the year of our Lord One thousand eight hundred and fifty-nine.

RICHARD LEAKE. (L.S.)
MATTHEW SYKES. (L.S.)

Witness,
WILLIAM GREEN,
Wosbro' Common,
near Barnsley.

LONDON:
Printed by GEORGE EDWARD EYRE and WILLIAM SPOTTISWOODE,
Printers to the Queen's most Excellent Majesty. 1859.

FIG. 1.



The filed drawing is not colored.

Drawn on Stone by Maltby & Sons.

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to the Queen's most Excellent Majesty. 1859.

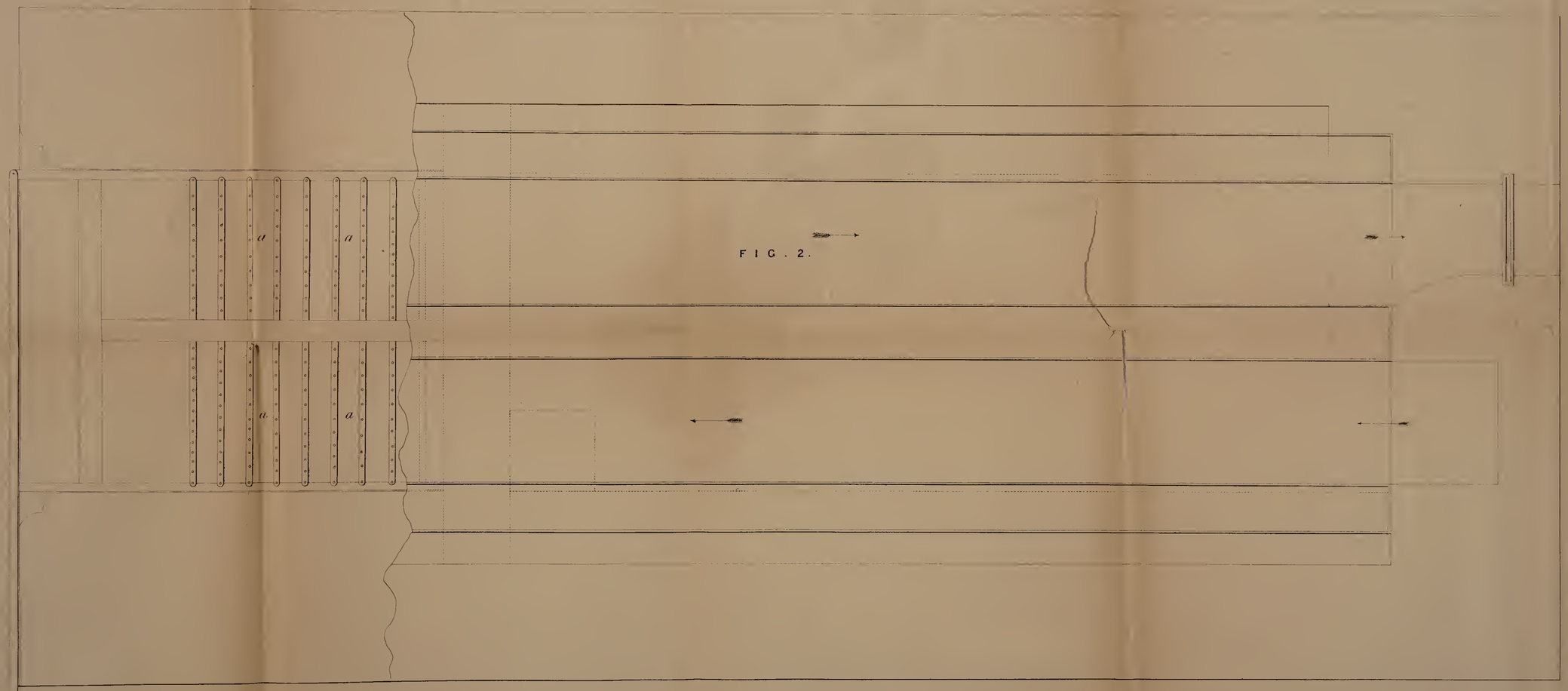

FIG. 2.

The filed drawing is not colored.

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FIG. 3.

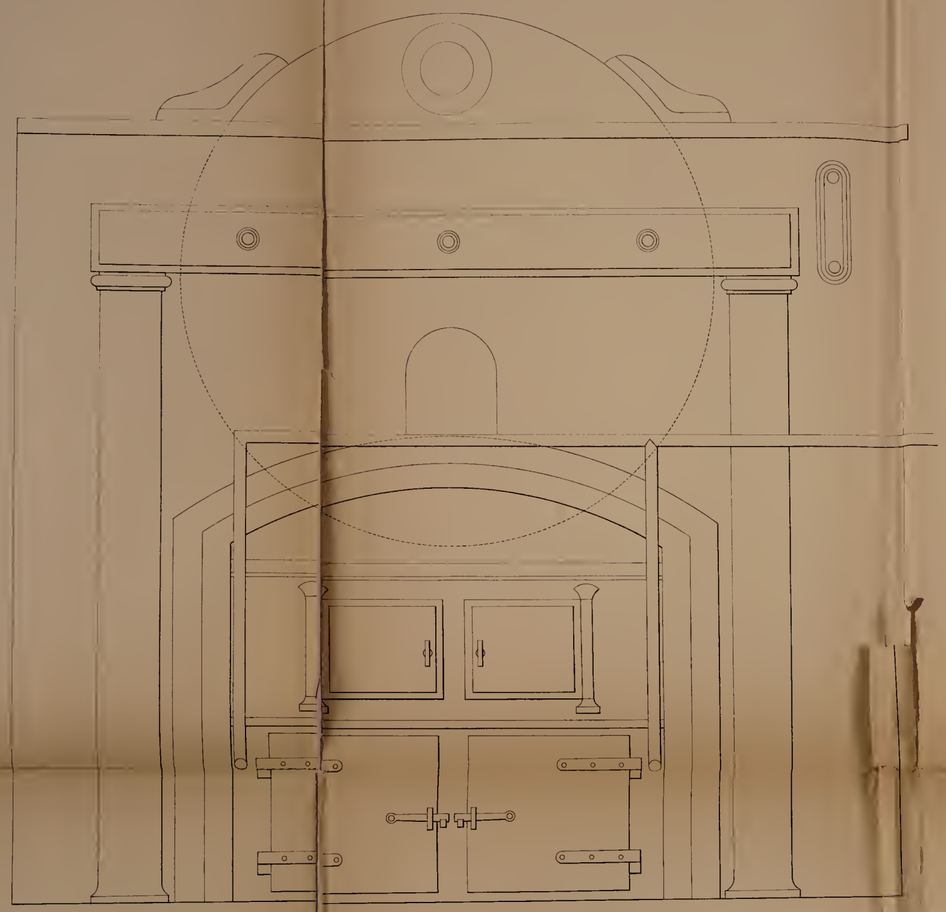


FIG. 4.

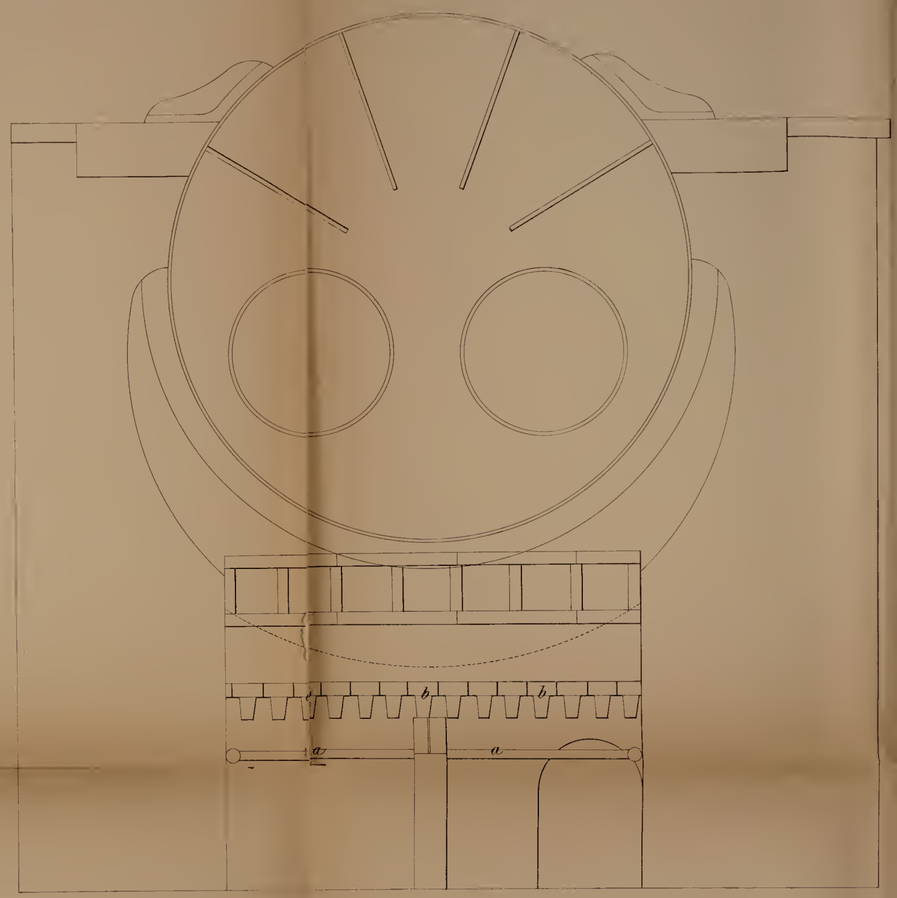


FIG. 5.

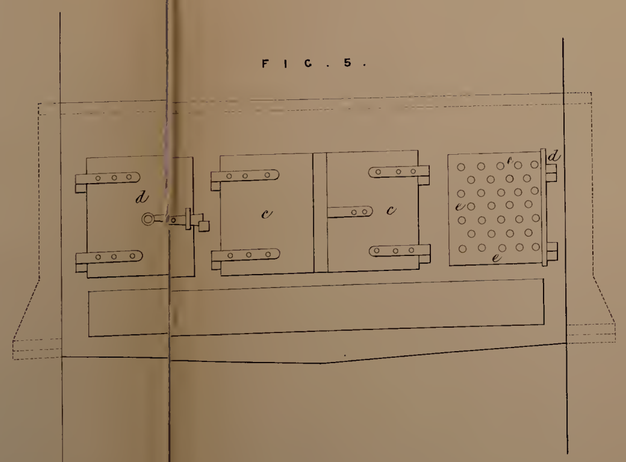
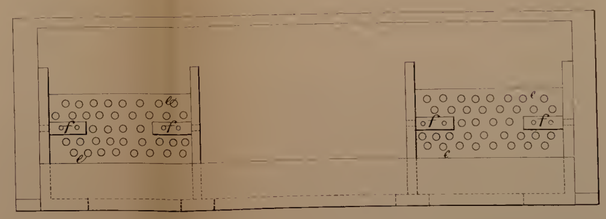


FIG. 6.



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